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Does a second offer that becomes irrelevant affect fairness perceptions and willingness to accept in the ultimatum game?

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Abstract

We develop a modified ultimatum game, in which the proposer gives two offers, and the responder selects one offer out of the two without seeing them. Then, the selected offer becomes the relevant offer, and the unselected offer becomes the irrelevant one. Finally, the responder evaluates the fairness of the pair of offers and makes a hypothetical decision whether to accept or reject the relevant offer. For most of our subjects, the level of the irrelevant offer positively affects fairness perceptions and willingness to accept, even though the irrelevant offer cannot be accepted. The reason is that the irrelevant offer does signal the proposer's intentions. Most responders give more weight to the relevant offer than to the irrelevant offer in evaluating fairness and in the willingness to accept. We call this effect the *relevance effect*. This effect is expected when considering the willingness to accept. However, it is unclear why the relevant offer should carry more weight when evaluating fairness, because the proposer makes the two offers together without knowing which one will become the relevant one. Therefore, this behavior can be considered a bias in fairness evaluations.

Keywords: ultimatum game, fairness perceptions, irrelevant offer, intentions

1 Introduction

Choosing between alternatives is part of our daily routine. In many cases, we see the consequences of both our chosen and unchosen options after the decision has been made.

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In finance, for example, choosing a certain portfolio implies giving up on some alternative investments. Time will tell if our chosen investment turned out to be better than our alternative or not. In some cases, information on the value of each alternative is available only after one alternative becomes irrelevant.

In this paper, we modify the ultimatum game (Güth, Schmittberger & Schwarze, 1982) to study how our willingness to accept offers is affected by offers we rejected and are no longer available to us. In the original game, a proposer offers a responder how to split a given amount of money and the responder is asked to choose whether to accept or reject the offer. If the offer is accepted, it is executed. If not, both the proposer and responder receive nothing. The subgame-perfect Nash equilibrium of the game is that the proposer demands the entire amount or the next highest possible amount, and the responder accepts the offer. However, prior results show that responders who receive offers lower than approximately 20% of the entire amount often reject them (Zeelenberg & Beattie, 1997), thus rejecting an opportunity to make a profit while punishing the proposer. Results from experiments on standard ultimatum games (e.g., Güth et al., 1982; Roth et al., 1991; Forsythe et al., 1994; Azar, Lahav & Voslinsky, 2015) show that on average, proposers offer to responders roughly 30–40% of the given amount. Branas-Garza et al. (2014) show that punishers can be either prosocial or antisocial — unfair and spiteful.

As research on the ultimatum game evolved, evidence pointed mainly to social preferences and emotions as reasons for the difference between behavior and theory. Most of the studies on the ultimatum game propose (or at least insinuate) that fairness plays an important role in this game. Subjects expect to be treated fairly, and punish unfair behavior by rejecting offers that they perceive as unfair, leaving the proposer to receive nothing, at a cost to themselves. For example, Güth (1988), Straub and Murnighan (1995), Brandts and Solà (2001), Falk, Fehr and Fischbacher (2003) and Bereby-Meyer and Grosskopf (2004) found connections between fairness levels of offers and willingness to accept. Moreover, responders are not the only ones to expect fairness. Proposers also realize that unfair proposals might be rejected, and allow themselves to be unfair when their proposals cannot be fully observed. Bolton and Zwick (1995), Straub and Murnighan (1995) and Dana, Weber, and Kuang, (2007) found that proposers are more generous when they know their decisions can be observed by others. Pillutla and Murnighan (1995), Straub and Murnighan (1995), Croson (1996), Kagel, Kim and Moser (1996) and Rapoport, Sundali and Seale (1996) showed that proposers offer lower amounts when the size of the divided amount is unknown. Finally, fairness is relative. Novak, Page and Sigmund (2000), for example, show that information on offers that were rejected in the past generate fair offers.

With regards to emotions that motivate behavior in the ultimatum game, results point to anger (Pillutla & Murnighan, 1996), fear of rejection (Kravitz & Gunto, 1992), sense of superiority (Hoffman et al., 1994) and regret (Zeelenberg & Beattie, 1997; Martinez, Zeelenberg & Rijsman 2011). See Güth and Kocher (2013), Zeelenberg et al. (2000) and Martinez, Zeelenberg and Rijsman (2008) for reviews.

In our modified game, the responder received two sealed offers from the proposer and chose one of the offers as a relevant one before knowing their content. The proposer had no control on which offer was selected by the responder. Then, after both offers were revealed, the responder could accept or reject only the relevant offer. The other offer became irrelevant, but it could still reveal the intentions of the proposer, who did not know it would become the irrelevant offer. The main objectives of this study are to understand the effect of the irrelevant offer on fairness perceptions and on the willingness to accept offers.

Some earlier studies modified the ultimatum game to have more than one offer, one proposer or one responder, in different ways from ours. Fischbacher, Fong and Fehr (2009) and Coats et al. (2013) introduced two games with multiple proposers, showing that responders then demand higher amounts, taking advantage of the increased competition on the responders' willingness to accept. Bazerman, White and Loewenstein (1995) argued that when evaluating multiparty transactions, people seem to compare their own outcomes with those of others, which is also consistent with a competitive environment. On the other hand, when the competition is among responders (as in Knez & Camerer, 1995), and proposers make simultaneous offers to two responders, perceived unfairness of the lower offer is increased.

As we explain below, our subjects were not paid based on their answers. A large part of our study is about fairness perceptions, which are subjective and known only to the subject and thus cannot be rewarded for accuracy. Another part of our study is about decisions to accept or reject offers. These could in principle be done with real incentives, but we followed the survey methodology for consistency. (We discuss this issue further in the conclusion section.) Accordingly, we evaluate intentions to accept or reject offers rather than actual decisions about real money. The literature, however, shows consistency between intentions and decisions. Falk et al. (2013) measured social preferences using a lab experiment and a survey taken one week later. They found a positive correlation between the minimum acceptable offer in an ultimatum game as reported in the survey and revealed from the lab experiment. Rustichini and Villeval (2014) presented subjects with a hypothetical ultimatum game and elicit participants' fairness perceptions and hypothetical choices. One week later, participants were invited to play the ultimatum game. Hypothetical and real choices in the ultimatum game did not differ. These findings are consistent with the general rule that the practical implications of actions affect fairness judgments.[1]

[1]Slonim and Roth (1998) found that even a large change in the level of incentives (by a factor of 25) has only a small effect on actions of inexperienced players.

2 Experimental design and research questions

2.1 Participants

We conducted an Internet survey with 203 participants, using the Qualtrics software. All participants were students at Ben-Gurion University of the Negev from various disciplines, recruited by posting announcements on an electronic university-wide message board. No individual filled out more than one questionnaire. Among those completing the survey, prizes of 90 NIS (approximately 26 US dollars at the time) were given by a lottery; the chance to win was 1 to 10. All participants knew the size of the prize and the chance of winning in advance. 54% of the participants were female, and the age ranged between 18 and 52 (M = 25.40, SD = 3.40).

2.2 The questionnaire

The questionnaire contained three sections. One section consisted of the standard ultimatum game (Güth et al., 1982), another section consisted of the modified game we developed with two offers, and the last section consisted of demographic questions and the lottery. Two versions of the survey were circulated randomly to participants, differing by the order of the two games. In each of the first two sections, after the instructions of the game, we presented several questions to test the participants' understanding of the instructions (included in the Appendix). Participants had to answer all questions correctly to continue.

In the standard ultimatum game presented to the participants, the proposer was given 100 coins and could choose to offer the responder 20, 30, 40, 50 or 60 coins. If the proposal was accepted, it was executed, and if the proposal was rejected, both players got nothing. In the modified game, the proposer was also endowed with 100 coins, and made two different offers, also among the options of 20, 30, 40, 50 and 60 coins. Then, before the offers were revealed, the responder selected one of them. The chosen offer became the relevant offer, and the other one became the irrelevant offer. Then, both offers were presented to the responder, who then decided whether to accept or reject the relevant offer.

After the rules of the games were explained, participants were asked several hypothetical questions about their behavior if they were to participate in such games. In particular, they had to decide for each possible offer, or, in the modified game, for each possible pair of offers (one of which became the relevant offer), whether to accept the offer or not, and to evaluate how fair the proposer was. Fairness was rated on a scale of 1 = "very unfair" to 7 = "very fair".

In the second section, participants who started with the standard game continued with the modified game and vice versa. In the standard game, participants were asked to evaluate the five possible offers, and in the modified game, they were asked to evaluate the 20 possible pairs of offers. In total, 25 offers and pairs of offers were presented to each participant. Finally, the third section presented several general demographic questions (e.g., gender and

age) and subjects were invited to participate in a lottery, where they could win a prize of 90 NIS.

2.3 Research questions

As we explained above, our questionnaire elicited two types of information: fairness perceptions and willingness to accept. Our first two questions concern the effect of the irrelevant offer on fairness perceptions and the willingness to accept offers. Although an irrelevant offer cannot be accepted, it does signal intentions. For example, the fairness perception of a relevant offer to give 40% should be evaluated higher when the irrelevant offer is to give 50%, compared to an irrelevant offer to give 20% because on average, the proposer is more generous. Similarly, responders may be more willing to accept an offer to receive 30% when the irrelevant offer is to receive 40%, compared to the case where the irrelevant offer is to receive 20%.

Both the relevant and the irrelevant offers should reflect the proposer's intentions evenly, as there is an equal chance for each proposal to be selected and become relevant and the proposer had no influence on that choice. Therefore, both fairness perception and the willingness to accept offers should not depend on the choice of the relevant offer. Our first research question deals with the fairness perceptions:

Do responders attribute an equal weight to both the relevant and irrelevant offers when forming fairness perceptions?

The second research question similarly examines the difference between the two offers but it deals with the willingness to accept the offer:

Do responders attribute an equal weight to both the relevant and irrelevant offers when choosing whether to accept or reject the relevant offer?

Previous studies on the ultimatum game suggest that choices are consistent with fairness perceptions (Straub & Murnighan, 1995; Pillutla & Murnighan, 1996; Zeelenberg & Beattie, 1997; Güth, 1988). Therefore, we should observe a positive relationship between the fairness perception of offers and the willingness to accept them in both versions of the game. Examining if this is indeed the case leads to our third research question:

Is the willingness to accept offers positively correlated with fairness perceptions?

3 Results and discussion

With a total of 203 participants in the survey, our data include 203 sets of fairness perceptions (each set with judgments of 20 offers of the modified game and 5 offers of the standard game) and 203 sets of hypothetical choices of willingness to accept an offer (each set with 20 choices of the modified game and 5 choices of the standard game). We define the games where proposers propose one offer as "standard games". Offers in the standard games are "standard offers". Games where proposers propose two alternative offers are "modified

games", and each pair of offers is a "modified offer", which includes a relevant offer that the responder chose, and an irrelevant offer.

Table 1 presents descriptive statistics of some relevant variables, divided by the game type (modified or standard). Willingness to accept is calculated as the percentage of offers that were hypothetically accepted across all responders, and fairness perceptions are calculated as the average of fairness perceptions on a 1–7 scale.

TABLE 1: Fairness perceptions and hypothetical choices. "Willingness to accept rate" is the percentage of hypothetically accepted offers among all subjects. "Fairness perceptions" is the average evaluation of fairness on a 1–7 scale among all subjects.

Variable	Observations	Mean	Std. Dev.
Willingness to accept rate in the modified game	4,060	84%	0.37
Willingness to accept rate in the standard game	1,015	82%	0.39
Fairness perceptions in the modified game	4,060	4.32	1.89
Fairness perceptions in the standard game	1,015	4.33	2.18

According to Table 1, the summary values of both willingness to accept and fairness perceptions are similar between the standard and modified games. As mentioned earlier, some participants started the survey with the standard game and continued with the modified game, while others answered the survey in the reverse order. We tested the game order effect and the effect of demographic variables (e.g., gender, age, education, place of residence) on hypothetical choices and on fairness perceptions, and found no order or demographic effects on both.

3.1 Fairness perceptions

Figure 1 presents the average fairness perceptions for each pair of modified offers, except for the black bars, which presents average fairness perceptions of standard offers. The white bars are the data of the modified game and the black bars are the data of the standard game. In the data from the modified game, the left number is the relevant offer amount. For example, 20,30 is 20 to the responder as a relevant offer and 30 to the responder as an irrelevant offer. Figure 1 shows that the relevant offer is positively correlated with fairness perception. However, they also show that fairness perception in the modified game is affected by irrelevant offers as well. A higher irrelevant offer increases fairness perception of the relevant offer. In the standard game, as expected, fairness perception is increasing with the offer amount.

Symmetric offers in the modified game are pairs of the same two offers, but in which the relevant offer in one pair is the irrelevant offer in the other. Figure 1 shows that there are differences in average fairness perceptions of symmetric offers. For example, the average fairness perception of the offer (20,40) is 2.62, whereas the average perception of the offer

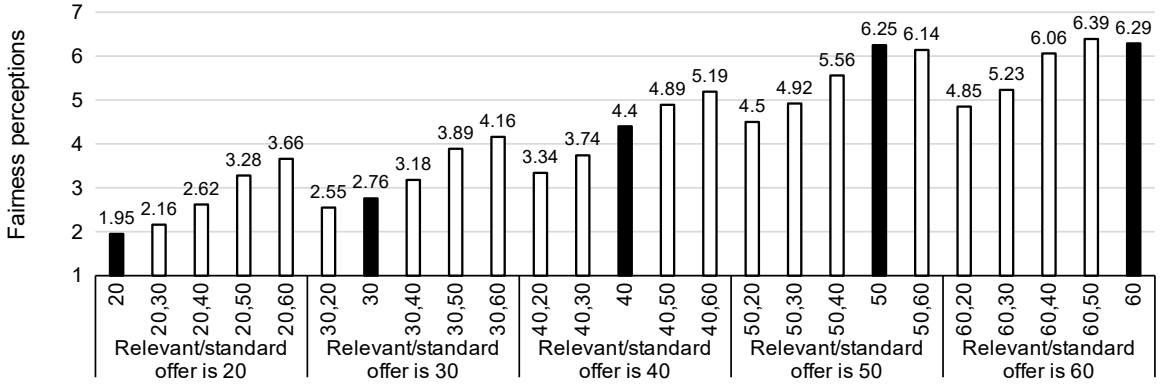

FIGURE 1: Average fairness perceptions conditional on relevant and irrelevant offers. The white bars are the data of the modified game and the black bars are the data of the standard game. The modified game offers are structured as follows: The first (i.e., left or bottom) number is the relevant offer amount to the responder and the second number is the irrelevant offer amount to the responder. For example, 20,30 is 20 to the responder as a relevant offer and 30 to the responder as an irrelevant offer. The standard game offer structure is: The number is an offer amount to the responder.

(40,20) is 3.34. The data suggest that while both relevant and irrelevant offers affect fairness perceptions, the effect of the relevant offer is higher.

To test the effect of irrelevant offers on fairness perception, we first counted the cases where responders' fairness perception of a standard offer equals their fairness perception when that offer is relevant in a modified offer. In roughly two-thirds (64%) of the standard offers, fairness perception is different compared to the same amount offered as relevant in a modified offer. A binomial test for the effect of irrelevant offers on fairness perceptions rejected the possibility that the alternative offer does not affect fairness perception ($p < .001$).

We also counted the number of cases where fairness perceptions to all modified offers with the same relevant offer were the same (i.e., cases where irrelevant offers do not affect fairness perception in modified offers). Here, 71% of related pairs are evaluated unequally. Again, a binomial test rejected the possibility that fairness perception is determined based solely on relevant offers ($p < .001$).

Further, only 36 participants (18%) evaluate fairness equally among all related pairs and for all relevant offers. These participants do not consider irrelevant offers when forming fairness perceptions. Eight of these subjects, however, evaluated the fairness of all offers identically, which may indicate that they consider neither the relevant nor the irrelevant offer amounts.

In sum, our findings thus far suggest that fairness perceptions depend also on irrelevant offers among the majority of our subjects. Our next step is to test if both relevant and irrelevant offers affect fairness perceptions equally. To analyze the attribution of both relevant and irrelevant offers to fairness perception, we regressed fairness perception on

both relevant and irrelevant offers (with individual random effects). The coefficients for the relevant offer and the irrelevant offer are 0.084 and 0.047 respectively, both significant at the 1% level and significantly different (a Wald test shows significant inequality at the 1% level). These figures suggest that individuals give the relevant offer almost double the weight of the irrelevant offer: an increase of 10 coins in the relevant offer increases fairness perception by more than 0.8, while the same increase in the irrelevant offer increases fairness perception by less than 0.5. This finding suggests that subjects value relevant offers much more than irrelevant offers when evaluating fairness, in spite of their knowledge that the proposer had no control over what offer would be relevant. We refer to this type of behavior as the *relevance effect*: the tendency to pay more attention to relevant offers, although their relevance is coincidental. As a robustness test, we also conducted the same estimation for each relevant and irrelevant offer separately, and the results are preserved. We conclude that the effect of both the relevant and irrelevant offers on fairness perception is independent of the value of the relevant or irrelevant offer.

We also regressed fairness perception on offers in the standard game. The coefficient is 0.122, significant at the 1% level. Interestingly, in the standard game, an increase of 10 coins in the offer increases fairness perception by 1.2, the sum of both coefficients in the modified game. This means that an increase of 10 coins to an offer in the standard game and an increase of 10 coins to both relevant and irrelevant offers in the modified game have the same effect on fairness perceptions.

Figure 2 shows the fairness perceptions of symmetric offers. Figure 3 shows the average differences in fairness perceptions between symmetric pairs with the same difference between relevant and irrelevant offers. Figure 3 shows an expected increasing trend. Considering that responders attribute more weight to relevant offers, then higher differences between the relevant and irrelevant offer generate higher differences in fairness perceptions. The concavity of the curve in Figure 3 implies that there is a diminishing effect of the difference between relevant and irrelevant offers on fairness perception.

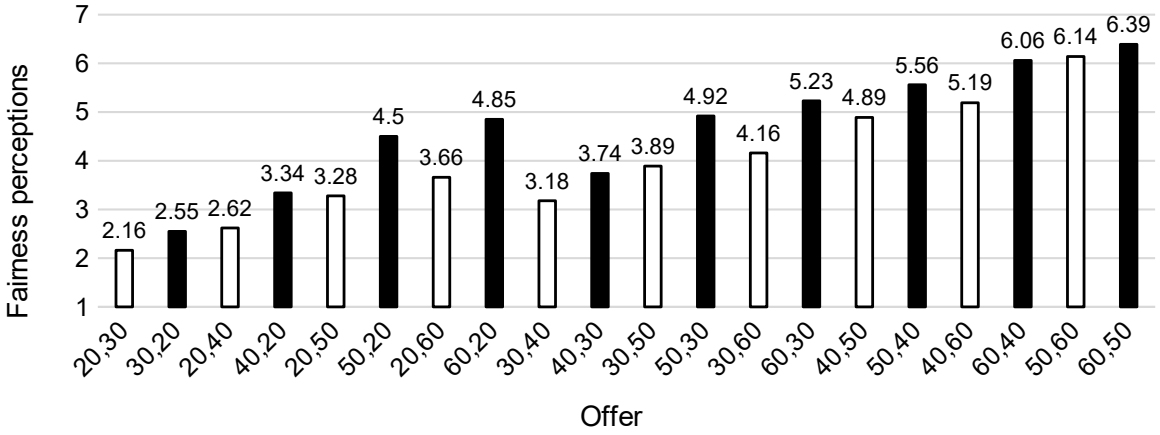

FIGURE 2: Fairness perceptions of symmetric offers. The black bars represent the average fairness perceptions of a modified offer with the higher offer being the relevant offer. The white bars represent the average fairness perceptions of a symmetric offer (with the lower offer being the relevant offer).

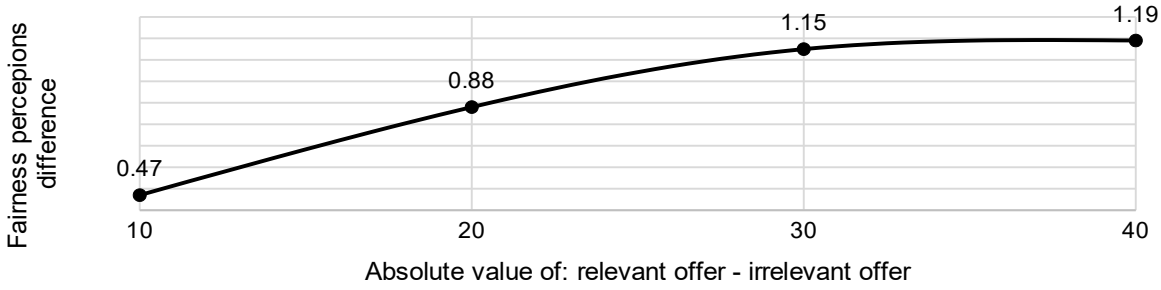

FIGURE 3: Differences in fairness perceptions between symmetric offers. "Fairness perceptions difference" is the average fairness perceptions of a modified offer minus the average fairness perceptions of a symmetric offer.

Figure 4 provides more detailed information compared to Figure 3, with differences of fairness perception for each symmetric offer. The figure shows a parabolic relationship between differences in fairness perception and offers level. For a given difference between a modified offer and its symmetric offer, difference in fairness perception is low when either both offers are low (e.g. 20, 30) or both offers are high (e.g. 50, 60). The reason for this exception is that responders perceive both offers 20 and 30 as unfair, while both 50 and 60 as fair. 10 paired t-tests for the difference between fairness perceptions of symmetric offers for each pair of modified and symmetric offers show significant difference for every pair ($p < .001$).

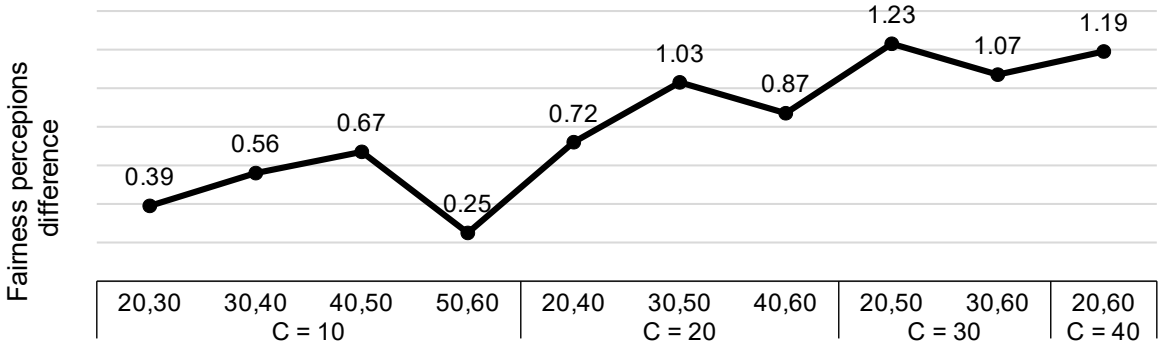

FIGURE 4: Difference in fairness perceptions between symmetric pairs, per offer. "Fairness perceptions difference" is the average fairness perception of a "modified offer" minus the average fairness perceptions of a "symmetric offer", for every symmetric pair, visually delimited by C, where C = 10, 20, 30, 40.

3.2 The willingness to accept

We now turn to analyze responders' willingness to accept offers. We calculate the acceptance rate (or "willingness to accept") of each offer as the number of responders who accepted that offer, divided by the total number of responders. Figure 5 presents these acceptance rates. The black bars of Figure 5 show acceptance rates of standard offers. The white bars of Figure 5 show acceptance rates of modified offers. Figure 5 shows similar trends to the ones we observed in fairness perceptions: the willingness to accept is increasing with both relevant and irrelevant offers. In the standard game, the willingness to accept is positively correlated with offers, with an exception of the offer (60), which is slightly lower than (50). Figure 5 also shows differences between the acceptance rates of symmetric offers. For example, the acceptance rate of (20,30) is 56%, and 68% for (30,20). The willingness to accept standard offers of 40, 50 and 60 or modified offers with the same relevant offers is relatively high and ranges between 89%-99%. These findings are in line with previous studies on ultimatum games showing high acceptance rates for offers of more than 30% (Zeelenberg & Beattie, 1997).

We first tested the effect of an irrelevant offer on the willingness to accept by comparing responders' decisions to accept standard offers with their decisions to accept modified offers with the same relevant offers. We find that in 8.5% of the decisions, responders decided differently when presented with a standard offer and when presented with that same offer as the relevant one in the modified game. We denote such cases as "inconsistent decisions" and refer to them in more details below. Inconsistent decisions are not irrational for a decision-maker whose utility function includes fairness concerns, because the irrelevant offer that exists in the modified game can affect the perceived fairness of the proposer and therefore can result in a different decision about the relevant offer compared to the same offer in the standard game. The rate of inconsistent decisions for each standard offer is 13.0%, 16.4%, 7.6%, 3.6%, 2.1% for standard/relevant offers 20, 30, 40, 50 and 60 respectively (all

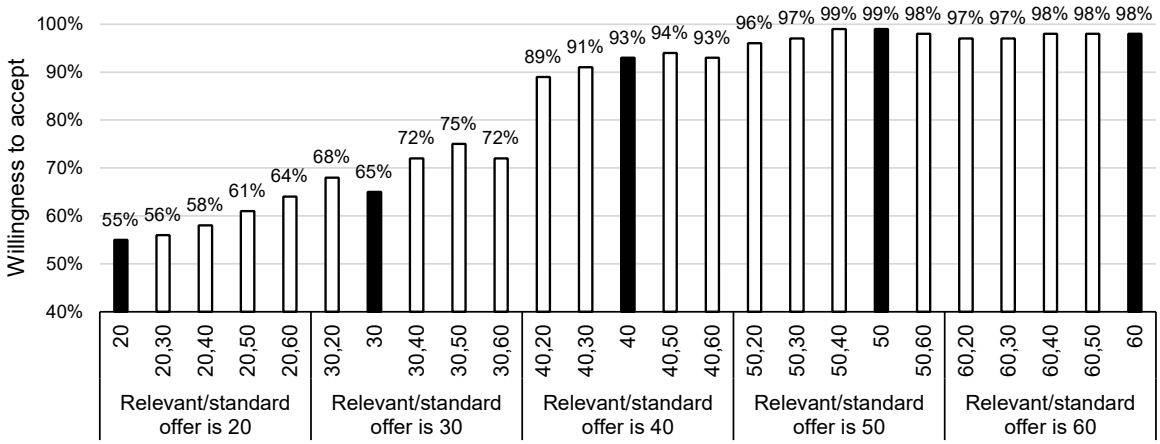

FIGURE 5: Average rates of willingness to accept. The white bars represent the modified game and the black bars represent the standard game.

significantly higher than zero using a one-sided binomial test, with p <.001). According to our results, while irrelevant offers affect the willingness to accept in general, most of the decisions to accept a standard offer are the same as the decisions to accept the same relevant offer in the modified game. While most of our subjects considered standard offers to be fairer than modified offers with the same relevant offer and a lower irrelevant offer, they were inclined to accept both. This tendency to accept is diminishing with lower offers.

Figure 5 shows different values of willingness to accept for a given value of relevant offer. We define a "decision set" as a group of all offers with the same relevant offer. Note that there are five decision sets for each responder. There are inconsistent decisions in 10% of the decision sets. Further, 52 participants (25% of total) made identical decisions in all their decision sets. These responders chose whether to accept a relevant offer regardless of the irrelevant offers.

To analyze the effect of both relevant and irrelevant offers on the willingness to accept, we regressed the willingness to accept on both relevant and irrelevant offers (with individual random effects). The coefficients for the relevant offer and the irrelevant offer are 0.010 and 0.001 respectively, both significant at the 1% level, and significantly different (A Wald test shows significant inequality at the 1%). While both relevant and irrelevant offers affect the willingness to accept, the relevant offer predicts willingness to accept about ten times as much as the irrelevant offer, which confirms the *relevance effect*. Similarly to fairness perception, when forming willingness to accept subjects pay more attention to the relevant offer, although the pair of offers were made by the same proposer without knowledge about what offer will become relevant.

The higher importance of the relevant offer is much more pronounced in forming willingness to accept compared to the fairness perception. This difference can be justified by the fact that willingness to accept is affected by economic considerations (either receiving or not the proposed offer), while fairness perception is not. Therefore, the relevant offer is the only thing that matters when making a purely economic decision. The irrelevant

offer can signal intentions and therefore affect fairness perception, but does not affect the forgone earnings in case of rejecting the offer. In fact, the differences between Figure 1 and Figure 5 may serve as evidence that, when deciding to accept an offer, proposer's intentions are irrelevant, while they become relevant in non-economic (or social) decisions such as evaluating fairness.

As a robustness test, we also conducted the same estimation for each relevant and irrelevant offer separately, and the results are preserved. However, these additional regressions show that the effect of the irrelevant offer on the willingness to accept is decreasing with the size of the relevant offer. This suggests that when the relevant offer is generous enough, responders care less about intentions as they are reflected in the irrelevant offer. In contrast, the effect of the relevant offer is relatively stable and is not affected by the level of the irrelevant offer.

We also regressed the willingness to accept on standard offers in the standard game. The coefficient is 0.012, significant at the 1% level. Similarly to the regression results for fairness perception, it seems that an increase of 10 coins in the standard game and an increase of 10 coins in both relevant and irrelevant offers in the modified game have the same effect on the willingness to accept the offer.

Figure 6 presents the willingness to accept symmetric offers. Black bars represent modified offers with the relevant offer being the higher offer, and white bars represent their symmetric offers. Comparing each white bar to the black bar on its right, we can see that when both offers are 40 or higher, acceptance rates are very high and therefore the difference in acceptance rates between symmetric offers is small. When one of the offers is 30 or 20, however, the difference between the symmetric offers becomes much more pronounced.

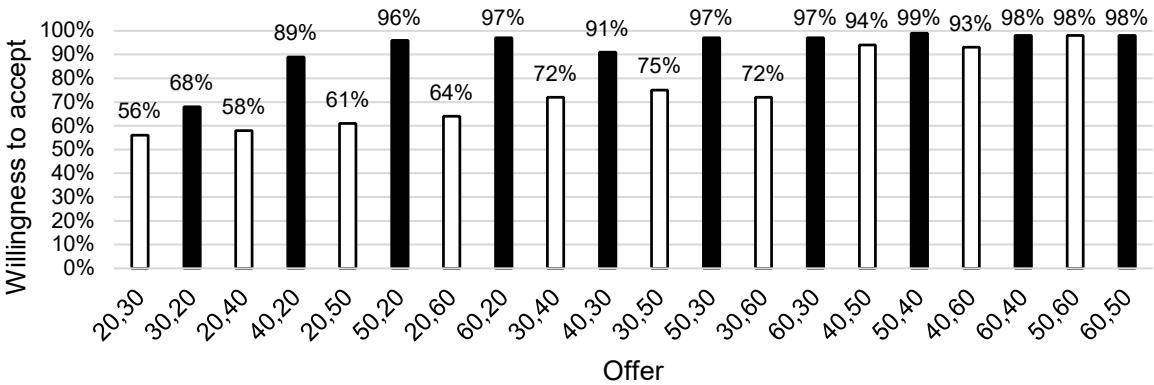

FIGURE 6: Willingness to accept of symmetric offers. The black bars are the average willingness to accept when the higher offer is the relevant offer ("modified offer"). The white bars represent the average willingness to accept when the lower offer is the relevant offer ("symmetric offer").

Figure 7 provides differences in willingness to accept between symmetric offers, this time divided by the difference between the relevant and irrelevant offer. Similar to Figure 3, the graph shows a positive and diminishing effect of the difference between relevant and

irrelevant offers on the willingness to accept. Figure 8 provides more detailed information compared to Figure 7, with differences of willingness to accept for each symmetric offer. Unlike the parabolic relationship between fairness perception and differences between modified offers, Figure 8 shows mostly a decreasing trend. This observation is consistent with our previous finding that subjects are willing to accept offers that they perceive as unfair.

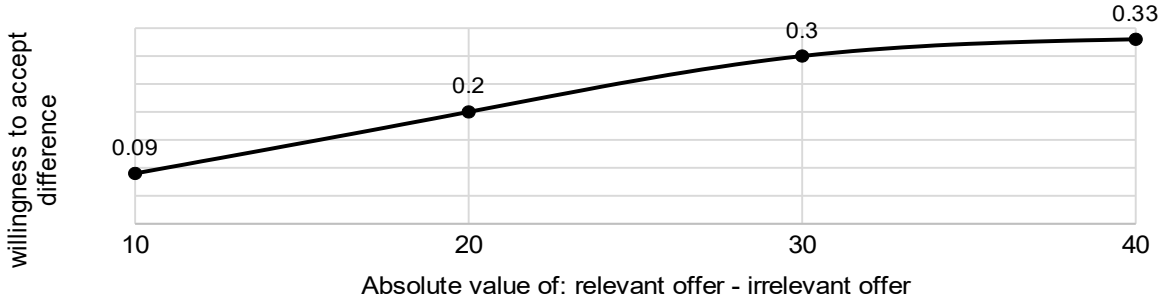

FIGURE 7: Differences in willingness to accept between symmetric offers. "Willingness to Accept difference" is the average willingness to accept of a "modified offer" minus the average willingness to accept of a "symmetric offer".

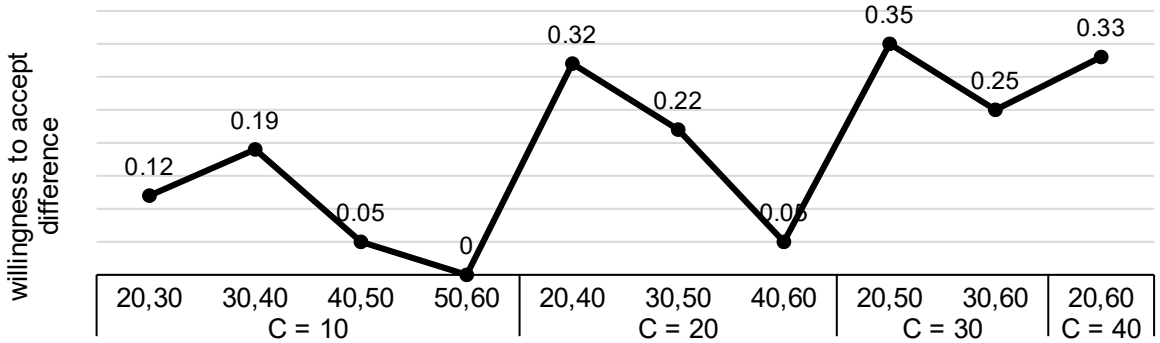

FIGURE 8: Difference in willingness to accept between symmetric pairs, per offer. "Willingness to Accept difference" is the average willingness to accept a "modified offer" minus the average willingness to accept a "symmetric offer", for every symmetric pair, visually delimited by C, where C = 10, 20, 30, 40.

3.3 The effects of fairness perceptions on the willingness to accept

In this subsection, we test the effect of fairness perceptions on the willingness to accept, using a linear probability model (LPM) regression, where the dependent variable is the willingness to accept and the independent variable is the fairness perception. Because the relationship between these two variables is likely to be different for different offers, we ran these regressions also for subset. We conducted several regressions, presented in Table 2: pooled over the entire data of the modified game (row 1); for each relevant offer (rows 2–6)

and for each irrelevant offer (rows 7–11) of the modified game; pooled over the entire data of the standard game (row 12); and for each offer in the standard game (rows 13–17).

TABLE 2: Results of regressions for each set and subset — the effect of fairness perceptions on willingness to accept.

Row	Game	Offers considered	β
1	Modified	All	0.0827***
2	Modified	Relevant = 20	0.0668***
3	Modified	Relevant = 30	0.0648***
4	Modified	Relevant = 40	0.0268***
5	Modified	Relevant = 50	0.0132**
6	Modified	Relevant = 60	0.0050*
7	Modified	Irrelevant = 20	0.0676***
8	Modified	Irrelevant = 30	0.0912***
9	Modified	Irrelevant = 40	0.0964***
10	Modified	Irrelevant = 50	0.0976***
11	Modified	Irrelevant = 60	0.1010***
12	Standard	All	0.0912***
13	Standard	20	0.1124***
14	Standard	30	0.1105***
15	Standard	40	0.0641***
16	Standard	50	−0.0064
17	Standard	60	0.0188**

The table reports the coefficient of the fairness rating in a regression with "willingness to accept" as the dependent variable. The regressions include subject random effects, except for the offers 50 and 60, because when the willingness to accept rates are 98% and 99%, the variance is not sufficient. ***, **, and ***, represent 10%, 5% and 1% levels of significance, respectively.

The results of the modified game show clearly that the willingness to accept is an increasing function of the fairness perception. Overall, an increase of 1 unit in fairness perception, increases the willingness to accept an offer by 8.3%. The results in rows 2–6 show that the effect of fairness perception decreases with the relevant offer. This finding is consistent with our previous finding that high relevant offers are accepted by most subjects, regardless of irrelevant offer values (i.e. fairness perception). When regressions are conducted for each level of irrelevant offer, the effect of fairness perception on the willingness to accept is fairly stable (with one exception when the irrelevant offer is 20).

In the standard game, on average (row 12), the effect of fairness perception on willingness to accept an offer is slightly higher than that of the modified game (difference is significant at the 5% level using a Wald test): an increase of 1 unit in fairness perception, increases the willingness to accept an offer by 9.1%. However, it is more pronounced in low offers (rows 13–14) than in higher offers (rows 15–17). This finding also demonstrates the tendency of subjects to think more economically and less emotionally when higher offers are on the table and give up on social preferences such as fairness.

4 Conclusion

We explored the effect of an irrelevant alternative on fairness perceptions and acceptance decisions in an ultimatum game, using an online survey. The survey presented two game types, the standard ultimatum game and the modified ultimatum game we invented. During the survey, participants stated their fairness perceptions and hypothetical acceptance decisions for each game type. In the modified game, the proposer gave two offers and the responder selected one of them as relevant (without seeing the offers before selecting), and the other offer became irrelevant. Then, after observing both offers, the responder was asked to evaluate the fairness of the proposer and to make a hypothetical decision whether to accept or reject the relevant offer.

We found that in the modified game, the irrelevant offer positively affected fairness perceptions and willingness to accept, even though this offer could not be received. We argue that this happens because the irrelevant offer still signaled the intentions of the proposer, who did not know that this offer would become irrelevant. However, responders gave more weight to the relevant offer than to the irrelevant offer in evaluating fairness and in choosing whether to accept the offer. We call this effect the *relevance effect*. We found that this *relevance effect* is different between economic choices (whether to accept the relevant offer) and social preferences (rating the proposer's fairness). Our findings show that the irrelevant offer affects fairness evaluations more strongly than it affects the willingness to accept offers.

The stronger effect of the relevant offer compared to the irrelevant offer is expected when considering the willingness to accept, but it is less natural in evaluating the offers' fairness and can be considered a bias in fairness evaluation. The reason is that the proposer makes the two offers simultaneously without knowing which one will become the relevant one; the division to relevant and irrelevant offers is arbitrarily made as a blind choice of the responder. Therefore, it is not clear why the relevant offer should affect fairness perceptions almost twice as much as the irrelevant offer. It seems that responders consider the economic consequences of the offer and thus discount the offer that is no longer relevant compared to the offer that is relevant, even when judging the fairness of the proposer, who made the two offers when their role was the same and both could become relevant. In other words, a person's fairness is judged not only by his intentions but also by the resulting state of the

world, on which this person did not have full control. This is similar to rating a person who shot another person and killed him as more evil than someone who shot another person and missed. Although the intentions of both were the same, the outcome of whether the shot killed or missed affects the judgment about this person.

Regarding the decision whether to accept the offer, it is reasonable to give more weight to the relevant offer than to the irrelevant offer, as we found. Rejecting the offer punishes the proposer, who gets nothing. The cost of this punishment, however, is that the responder gives away what he was offered in the split. The relevant offer affects both the fairness of the offer and the cost of punishment — a higher relevant offer means the responder gives away more if he decides to punish. The irrelevant offer, however, affects the offer's fairness but not the cost of punishment. It therefore makes sense that the relevant offer will have more effect than the irrelevant offer on the decision whether to accept the offer. For example, an offer of (20, 40) (where the order does not indicate anything) may be perceived as relatively unfair. If the responder is willing to bear a cost between 20 and 40 to punish the unfairness of this offer, he will reject it if the relevant offer turns out to be 20, but not if the relevant offer becomes 40. That is, an asymmetry between the relevant and irrelevant offers can be justified when we consider the willingness to accept. Finally, our data also show that fairness perceptions are positively correlated with willingness to accept offers.

There are several limitations to this current study and directions for future research. One issue is the financial incentives that the participants have.[2] The part that measures fairness perceptions is problematic to do with incentives that are based on performance, because it elicits subjective perceptions, that the experimenter does not know and therefore cannot pay the participant based on how accurate his responses are. The part that elicits decisions about willingness to accept can be done with incentives, but we wanted to keep the experimental design reasonable and not too complex, and keep the data we gather for the fairness perceptions and the acceptance decisions comparable. However, conducting a separate experiment, without fairness evaluations, that uses our modified game as an incentivized experiment, does seem like a worthwhile idea for future research, and comparing between the results in such experiment to our findings about willingness to pay may also provide interesting insights. On the other hand, the results discussed in the last paragraph suggest that the average subject did think about the (hypothetical) economic effects as if they were real.

We do not say explicitly whether the proposer knows which of the two offers becomes the relevant one. This should not affect the fairness evaluations, but it may affect the willingness to accept, since rejection would be more informative to the proposer about what sort of offer is acceptable. Consequently, an idea for future research is to conduct an experiment that will manipulate the information provided to the responder about whether

[2]For a recent review of various issues related to incentives in experimental economics, including why they are viewed as important by many economists and why experiments without incentives are still helpful, see Voslinsky and Azar (2021).

the proposer gets to know the relevant offer, and examine how this information affects the results.

Another idea for future research is to ask subjects for their opinion about how fairness evaluations of the proposer should be formed, and then let them make decisions similar to our experiment. This can tell us whether explicit thinking about what should matter helps subjects to overcome the tendency to give the relevant offer more weight in judging the proposer's fairness.

Finally, another interesting direction for future research is to examine to what extent the behavior we documented occurs in other experimental games. That is, modifying other games in such a way that one player makes a decision that can result in different outcomes according to chance, and examining whether perceptions of this decision or this player (not only about fairness but also about trustworthiness, altruism, intelligence, morality, etc.) are evaluated differently by others depending on the outcome. That is, do raters who are given different information about the resulting state of the world evaluate the initial decision or the decision maker differently (even though the decision maker could not anticipate which state will be chosen by chance), and do they evaluate the decision or decision maker differently from raters who are not told what the eventual state of the world is.

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Appendix: Text of the survey (translated from Hebrew)

Preface

Hello,

My name is Alisa, I am a Ph.D. student at Ben-Gurion University of the Negev. This survey is part of a research in decision making, which I perform as part of my degree.

I would appreciate it if you take a few minutes for answering this questionnaire. After answering the questionnaire, you will be asked to participate in a lottery, where the prize is 90 NIS and the chance of winning is 1 to 10.

At the end of the survey (in a few weeks) the number will be drawn, and the winning number will be presented on the site alisabgu.simplesite.com. If you win the prize, please contact me by email (alisavo@post.bgu.ac.il) to receive the award.

The questionnaire is formulated in masculine form for convenience but is intended for both men and women. There is no correct or incorrect answer.

The data you fill do not include identifying information and will not be used beyond general statistical analysis. I would ask you, however, to fill in a number of general demographic details such as gender and age.

Thank you for cooperation!

Background for the one-split game

Please imagine a game where player 1 gets a sum of 100 coins and must split that amount between him and player 2.
Every 6 coins are worth 1 shekel.
There are 5 possible splits:
20 coins to player 2 and 80 to player 1
30 coins to player 2 and 70 to player 1
40 coins to player 2 and 60 to player 1
50 coins to player 2 and 50 to player 1
60 coins to player 2 and 40 to player 1
Player 1 must choose one split out of the five possible splits. This is his offer to player 2.
Then player 2 must make a decision - whether to accept or reject the proposed split. If he accepts, both players will receive the amount promised in the split, but if he rejects, both players will receive 0 coins.
You are asked to evaluate whether you would accept the offer and to what extent player 1 was fair.
Here are some questions regarding the description of the game. Their purpose is to check that the instructions were clearly given. Once you have answered the questions correctly, please proceed to the questionnaire.
Please remember that the remaining amount for player 1 is 100 minus the offer for player 2.

If player 1 chose to offer player 2: 40 coins
And player 2 accepted the split.
How many coins will player 1 receive? _____
How many coins will player 2 receive? _____

If player 1 chose to offer player 2: 30 coins
And player 2 rejected the split.
How many coins will player 1 receive? _____
How many coins will player 2 receive? _____

Please mark for each offer whether you would accept the offer and to what extent player 1 was fair. Remember that the remaining amount for player 1 is 100 minus the offer for player 2.

	Would you accept the actual offer?		To what extent was player 1 fair?
Offer to player 2	accept	reject	Very unfair 1 2 3 4 5 6 7 Very fair
20	O	O	O O O O O O O
30	O	O	O O O O O O O
40	O	O	O O O O O O O
50	O	O	O O O O O O O
60	O	O	O O O O O O O

Background for the two-split game

Please imagine a game where player 1 gets a sum of 100 coins and must split that amount between him and player 2.
Every 6 coins are worth 1 shekel.
There are 5 possible splits:
20 coins to player 2 and 80 to player 1
30 coins to player 2 and 70 to player 1
40 coins to player 2 and 60 to player 1
50 coins to player 2 and 50 to player 1
60 coins to player 2 and 40 to player 1
Player 1 must choose two different splits out of the five possible splits.
Player 2 chooses one split out of the two, without seeing both splits. The split selected by player 2 becomes the actual offer and the second split exists but player 2 cannot accept it (background offer).
Then player 2 must make a decision - whether to accept or reject the actual offer. If he accepts, both players will receive the amount promised in the actual offer, but if he rejects, both players will receive 0 coins.
You are asked to evaluate whether you would accept the offer and to what extent player 1 was fair.
Here are some questions regarding the description of the game. Their purpose is to check that the instructions were clearly given. Once you have answered the questions correctly, please proceed to the questionnaire.
Please remember that the remaining amount for player 1 is 100 minus the offer for player 2.

If player 1 chose to offer to player 2:
Offer *A* is 20 coins, offer *B* is 40 coins
Player 2 selected "blindly" offer *A* and after he saw it he accepted the split.

How many coins will player 1 receive? _____
How many coins will player 2 receive? _____

If player 1 chose to offer to player 2:
Offer *A* is 50 coins, offer *B* is 30 coins
Player 2 selected "blindly" offer *B* and after he saw it he rejected the split.
How many coins will player 1 receive? _____
How many coins will player 2 receive? _____

Please mark for each case whether you would accept the offer and to what extent player 1 was fair. Remember that the remaining amount for player 1 is 100 coins minus the offer for player 2.
Reminder: The split selected by player 2 becomes the actual offer and the second split exists but player 2 cannot accept it (it will be a background offer).

actual = actual offer to player 2 background = background offer to player 2

		Would you accept the actual offer?		To what extent was player 1 fair?
actual	background	accept	reject	Very unfair 1 2 3 4 5 6 7 Very fair
20	30	O	O	O O O O O O O
20	40	O	O	O O O O O O O
20	50	O	O	O O O O O O O
20	60	O	O	O O O O O O O
30	20	O	O	O O O O O O O
30	40	O	O	O O O O O O O
30	50	O	O	O O O O O O O
30	60	O	O	O O O O O O O
40	20	O	O	O O O O O O O
40	30	O	O	O O O O O O O
40	50	O	O	O O O O O O O
40	60	O	O	O O O O O O O
50	20	O	O	O O O O O O O
50	30	O	O	O O O O O O O
50	40	O	O	O O O O O O O
50	60	O	O	O O O O O O O
60	20	O	O	O O O O O O O
60	30	O	O	O O O O O O O
60	40	O	O	O O O O O O O
60	50	O	O	O O O O O O O

Please answer the following demographic questions

Gender: Male Female
Your age (in years) ____
Number of children ____
Years of education ____
Dwelling place: City Community settlement Moshav Kibbutz Else

The lottery

You will now be asked to participate in a lottery where a number between 1 and 10 will be drawn. If you guess the winning number, you will receive a 90 NIS reward.

Please enter any 8-digit number. _____

You must keep this number for verification in case you win the lottery. Note - you are not allowed to return to a previous page.

Please enter a number between 1 and 10. __

You must keep this number.

If you are interested, you can fill in your email address and after the lottery, in case you win, I will contact you via this email address. Alternatively, you can check the winning number of the lottery on a website whose address will be given on the next page and contact me by email listed on the next page if you find that you won the lottery. _____

The end

I am very grateful to you for filling out the questionnaire.
To check the winning number at the end of the survey (in a few weeks) please enter the webpage
alisabgu.simplesite.com
If you won the lottery, please contact me at the email address
alisavo@post.bgu.ac.il
Along with the 8-digit number you entered on the previous page, to coordinate receiving the award.
If you entered an email address on the previous page, I will contact you if you win the lottery.

Thank you very much for your participation!